FIG.1
PRIOR ART

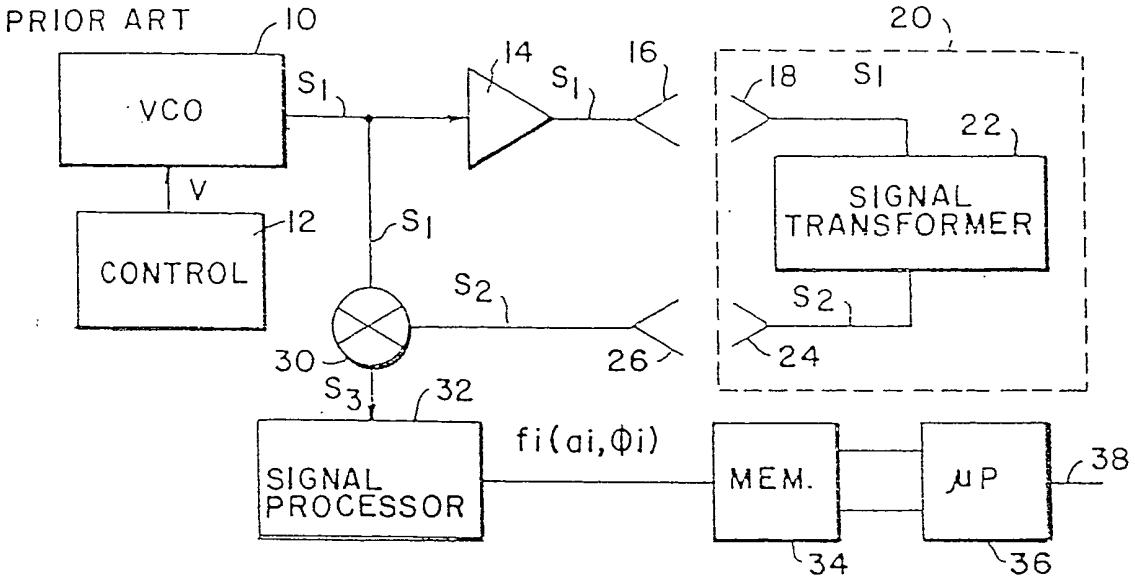


FIG.2
PRIOR ART

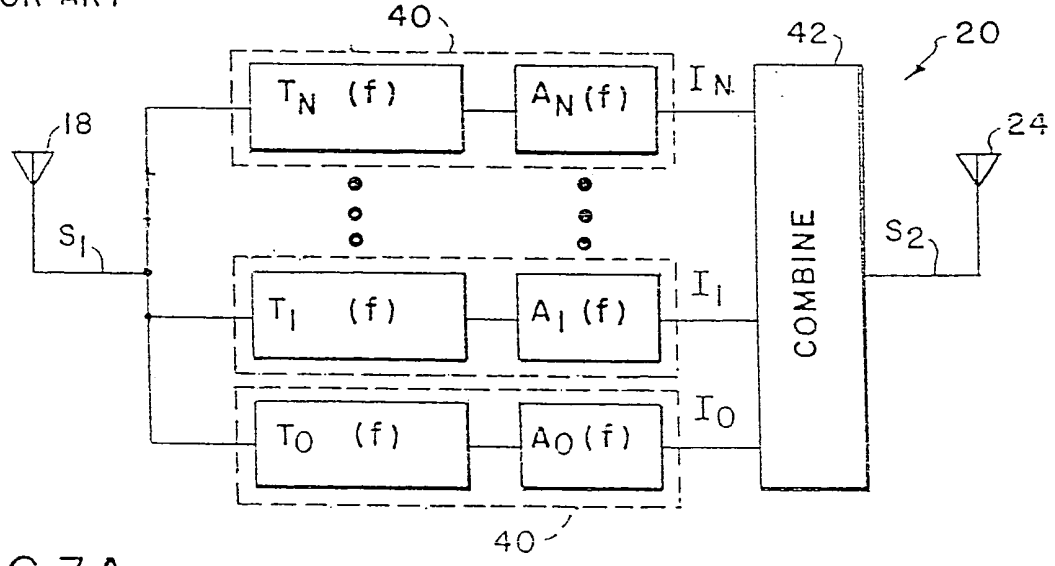


FIG.3A
PRIOR ART

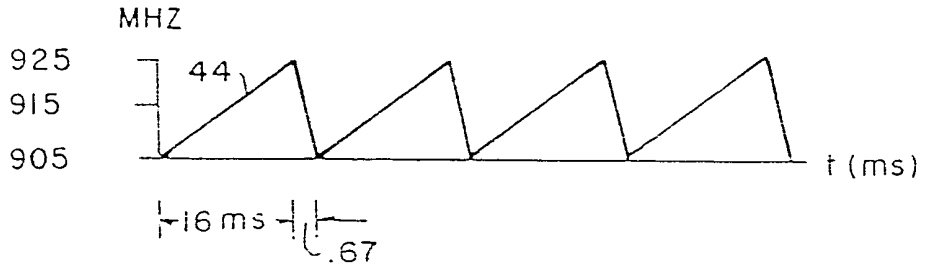


FIG.3B
PRIOR ART

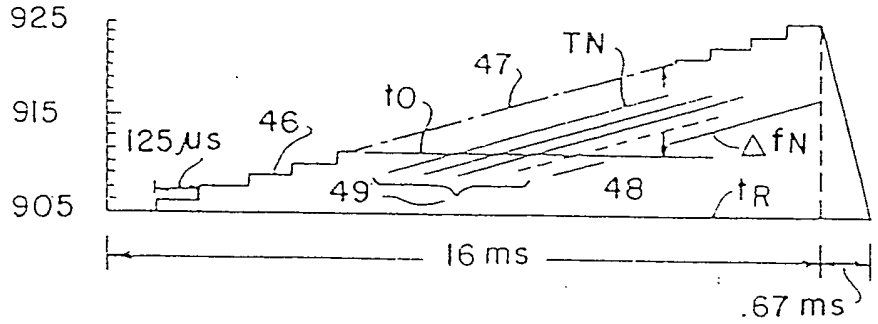


FIG.4
PRIOR ART

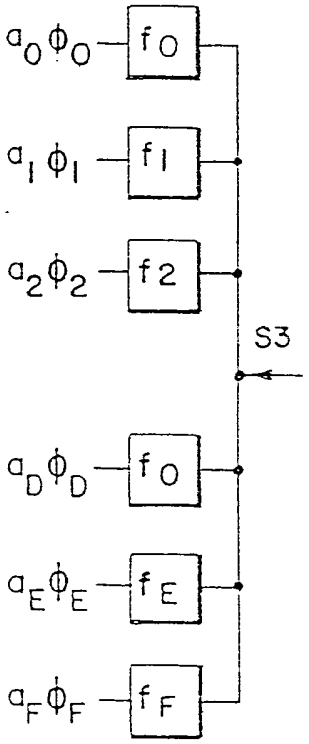


FIG.5
PRIOR ART

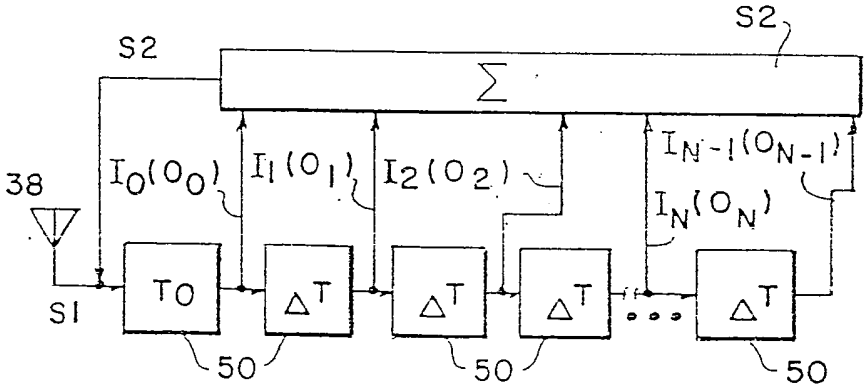


FIG.7
PRIOR ART

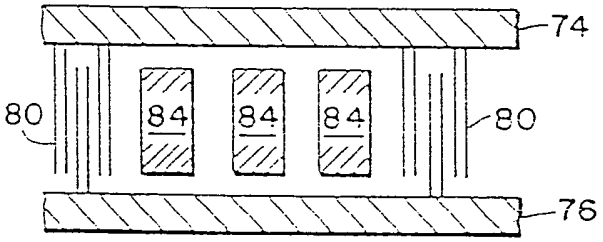


FIG.6
PRIOR ART

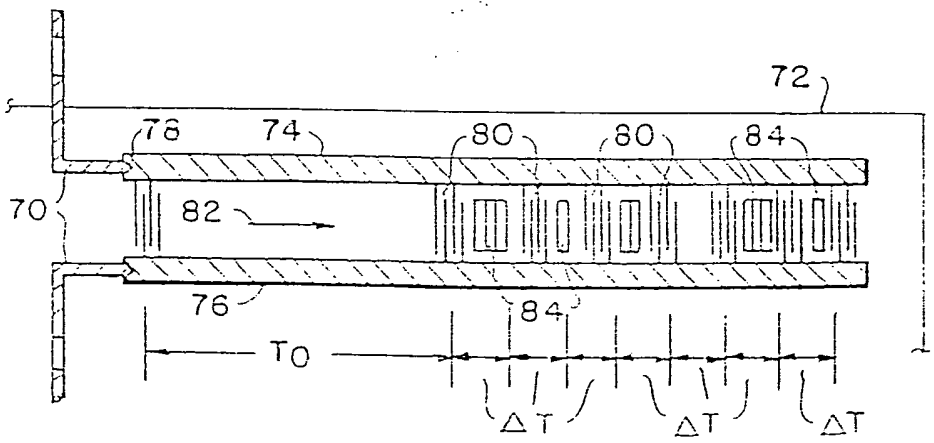


FIG.8A
PRIOR ART

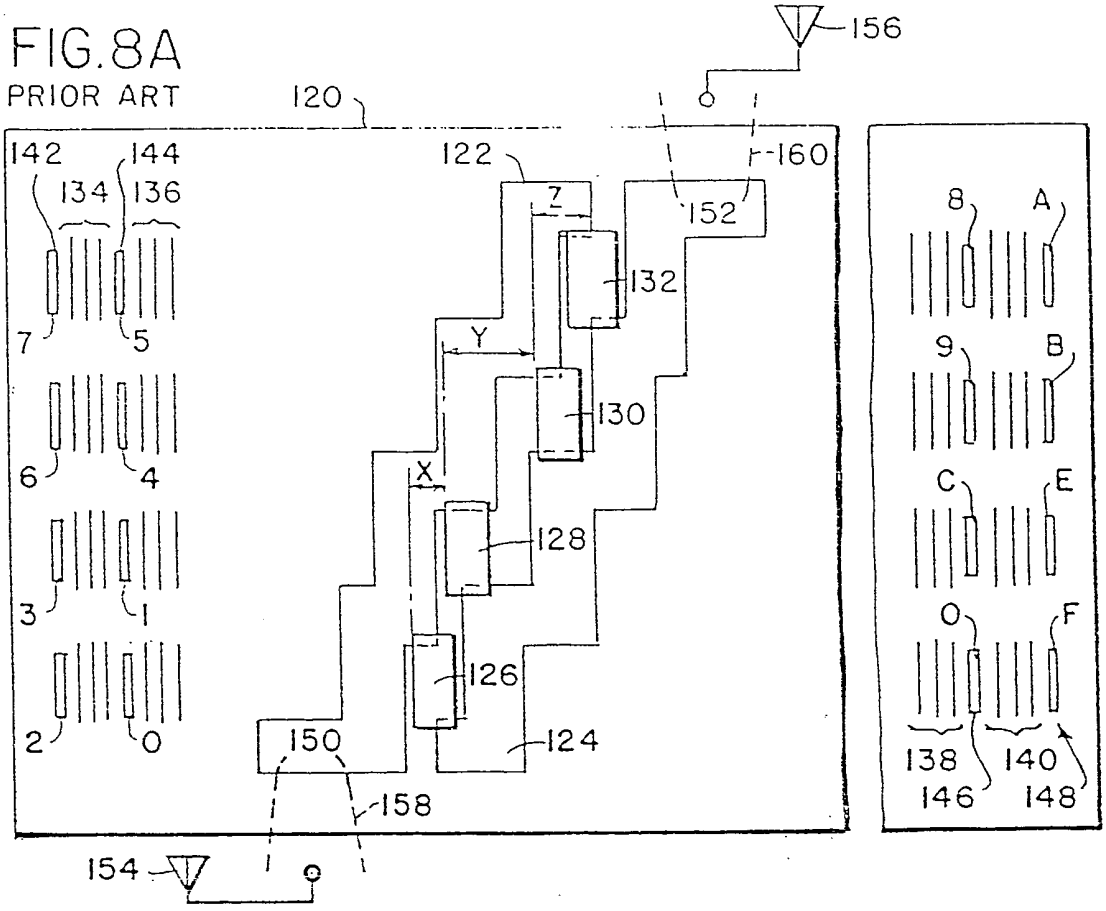


FIG.8B
PRIOR ART

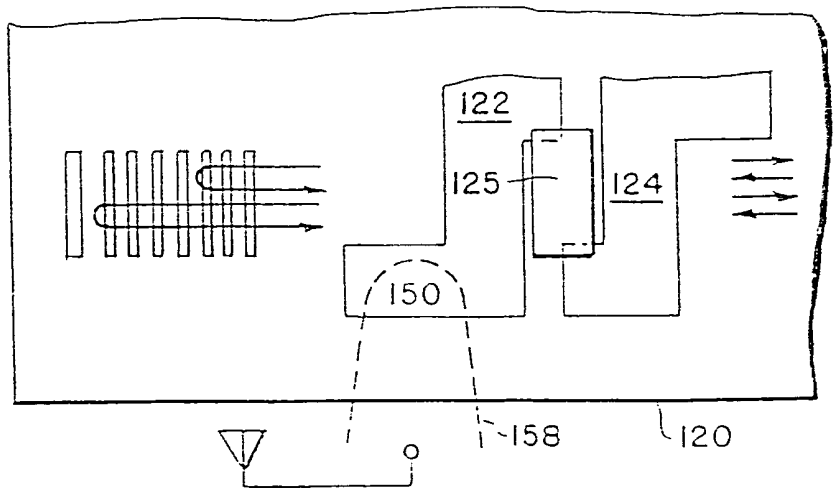


FIG.9A

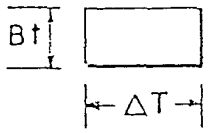


FIG.9B

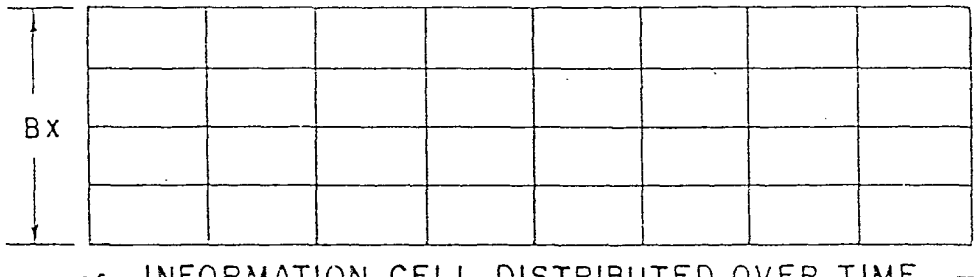


FIG.9C

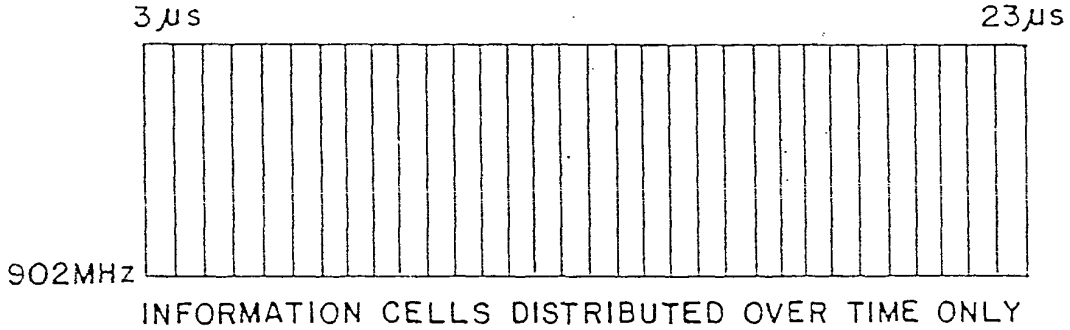
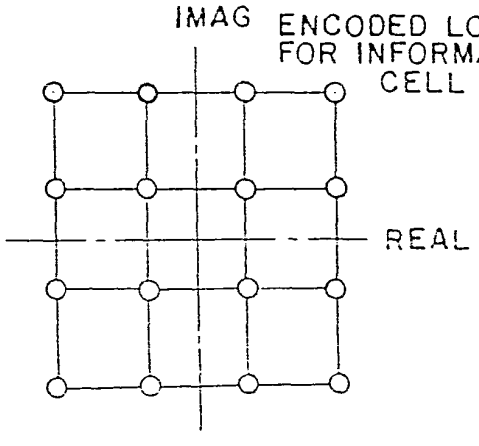
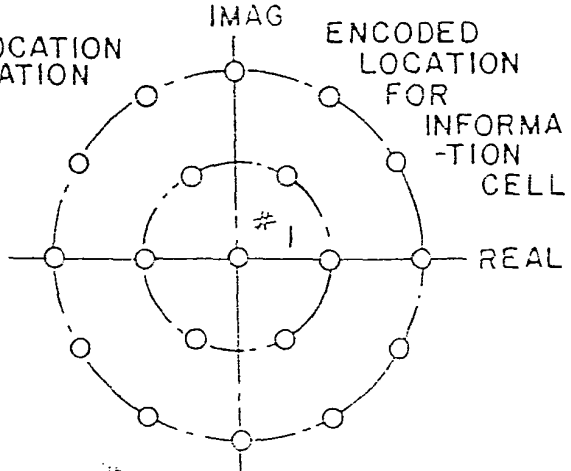


FIG.10A



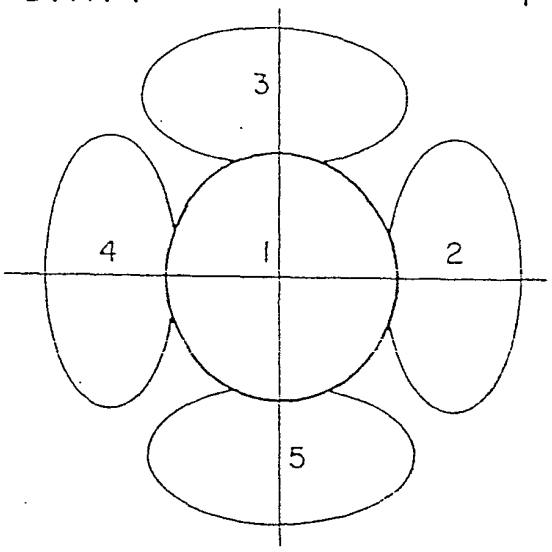
QAM (16) ENCODING
RECTANGULAR MODULATION

FIG.10B



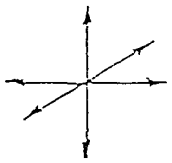
1 CELL NOT USED
QAM (18) ENCODING
POLAR MODULATION
(BETTER SUITED SAW APPLICATION)

FIG.11A



BEAM PATTERN COVERAGE USING PATCH LIKE ANTENNA (PROJECTION VIEW)

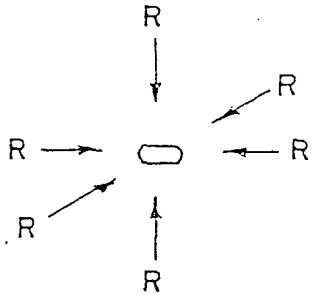
FIG.11B



POLARIZATION AXES
POLARIZATION COVERAGE

SPATIAL DISCRIMINA
-TION MULTI-READ
POINTS
SPATIAL COVERAGE

FIG.11C



R = READERS

FIG.12A

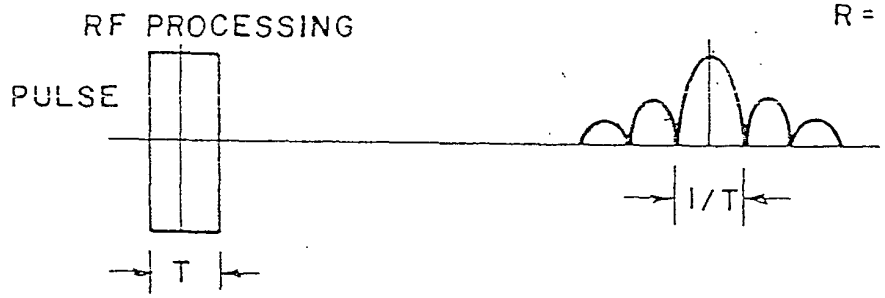


FIG.12B

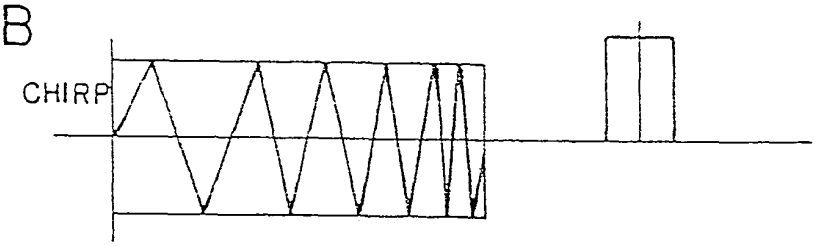


FIG.12C

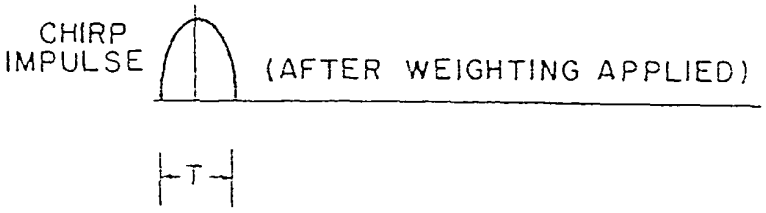
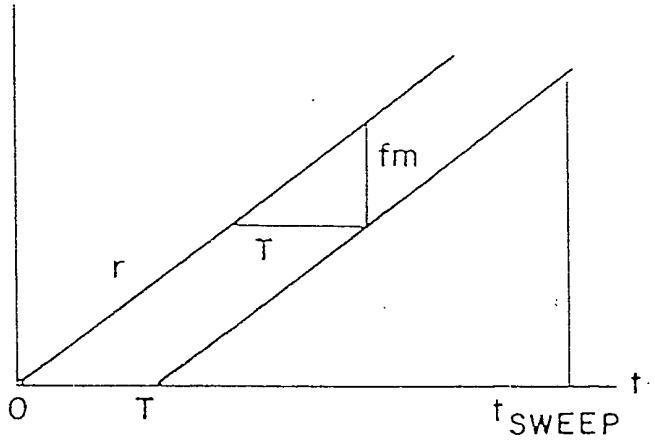


FIG.12D



$fm = Tr$

t_{SWEEP} = SWEEP TIME

$1/t_{SWEEP}$ = NOISE BANDWIDTH OF DETECTOR

FIG.13

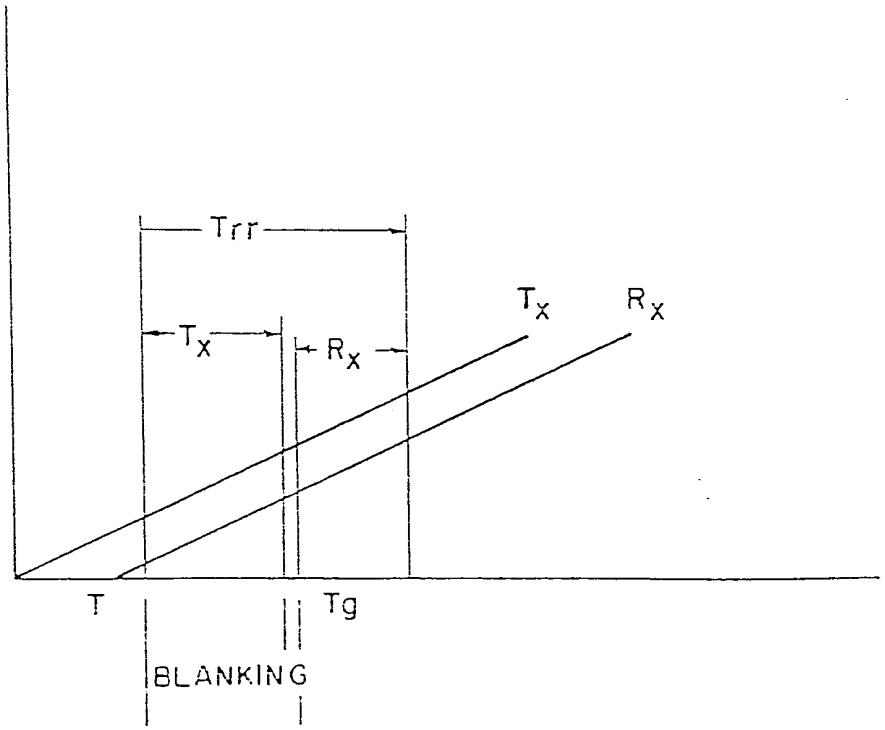
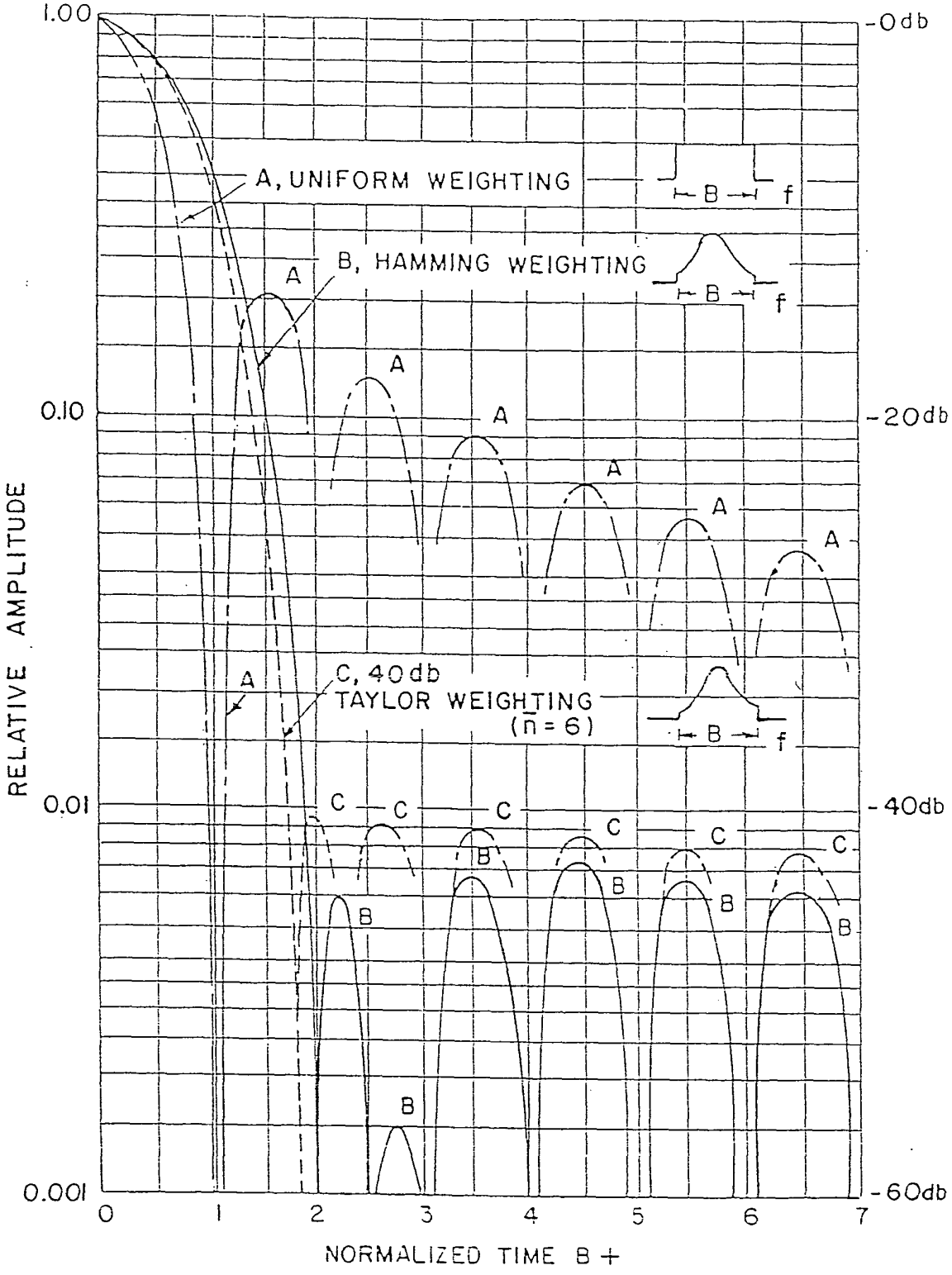
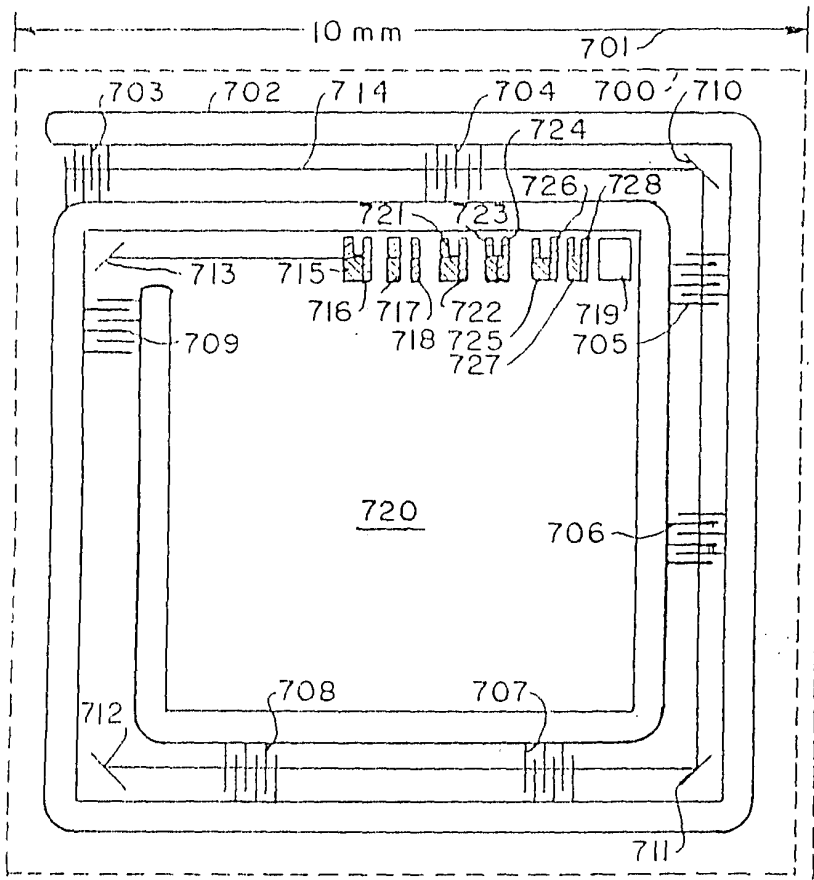


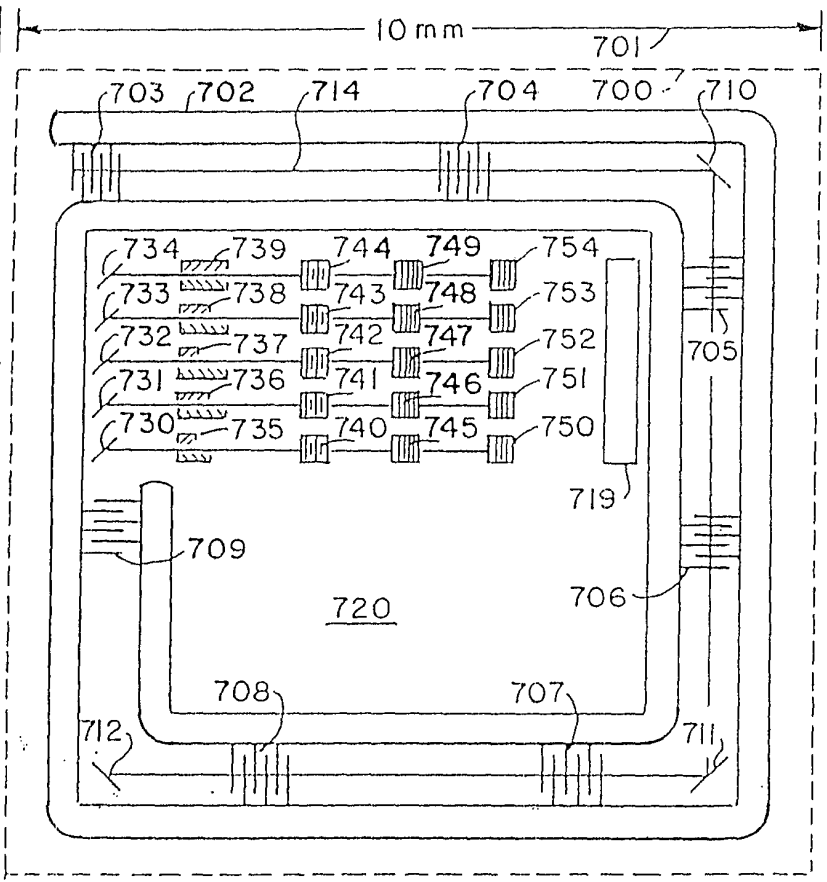
FIG.14


1.00
0.10
0.01
0.001
-0db
-20db
-40db
-60db
RELATIVE AMPLITUDE
A, UNIFORM WEIGHTING
B, HAMMING WEIGHTING
C, 40db
TAYLOR WEIGHTING
(n̄ = 6)
B
f
A
B
C
0
1
2
3
4
5
6
7
NORMALIZED TIME B +



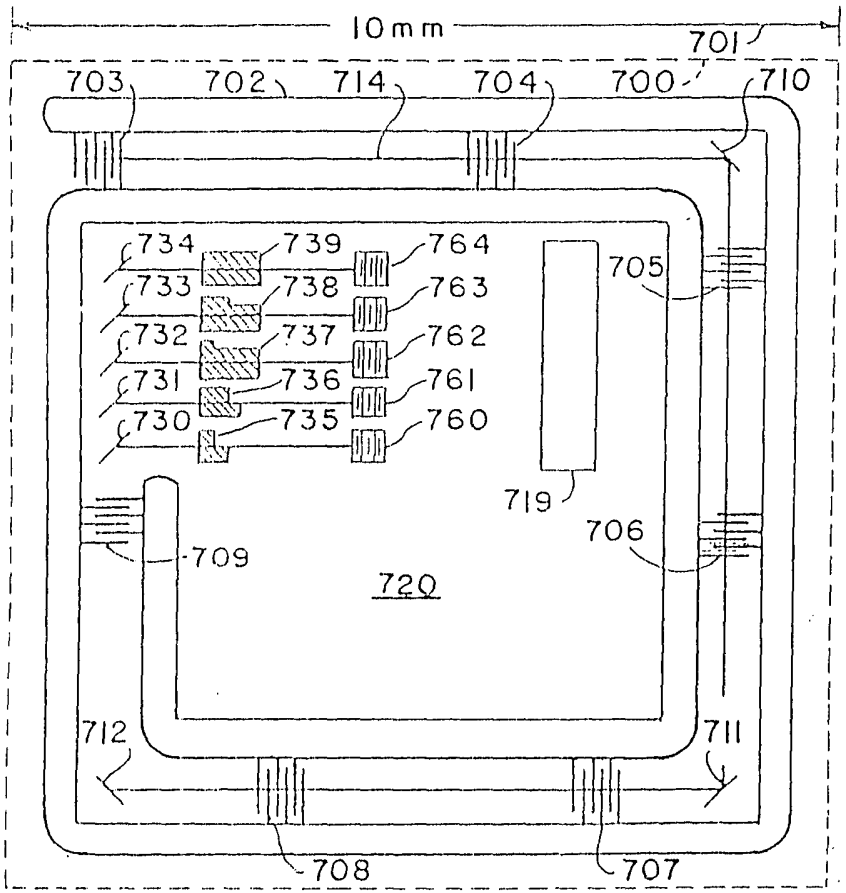
TRANSDUCER SELECTED FOR 1 OF Nf FREQ BANDS.
HIGH EFFICIENCY CORNER REFLECTOR
AMPLITUDE WEIGHTED DELAY PAD
BROAD BAND PARTIAL REFLECTOR

FIG.15



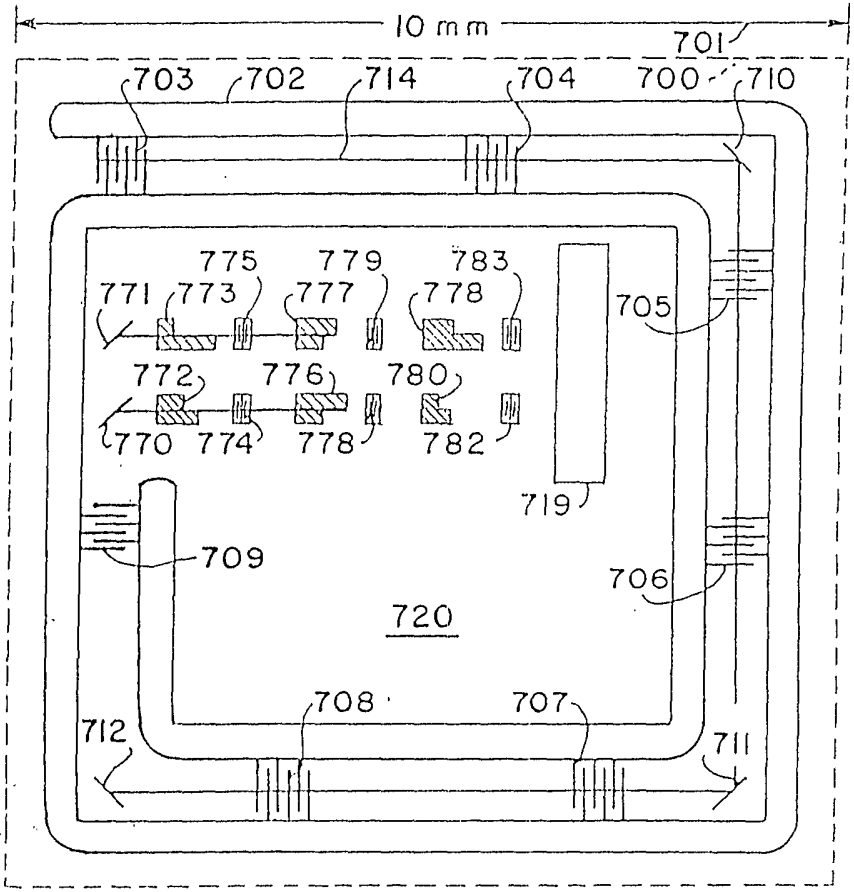
TRANSDUCER SELECTED FOR 1 OF Nf FREQ. BANDS
HIGH EFFICIENCY CORNER REFLECTOR
PARTIAL 90 DEG. REFLECTOR
AMPLITUDE WEIGHTED DELAY PAD
FREQUENCY SELECTIVE REFLECTOR

FIG.16



TRANSDUCER SELECTED FOR I OF Nf FREQ. BANDS
HIGH EFFICIENCY CORNER REFLECTOR
PARTIAL 90 DEG. REFLECTOR
AMPLITUDE WEIGHTED DELAY PAD
BROAD BAND REFLECTOR

FIG.17



TRANSDUCER SELECTED FOR I OF Nf FREQ. BANDS
HIGH EFFICIENCY CORNER REFLECTOR
PARTIAL 90 DEG. REFLECTOR
AMPLITUDE WEIGHTED DELAY PAD
BROAD BAND PARTIAL REFLECTOR

FIG.18

FIG.19A

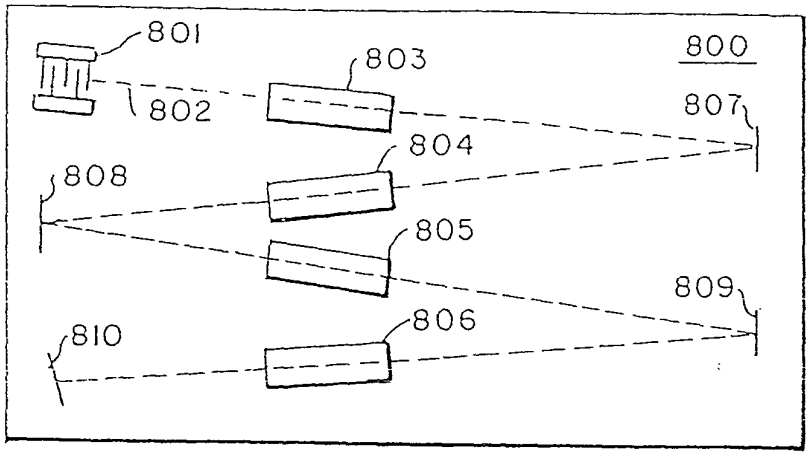


FIG.19B

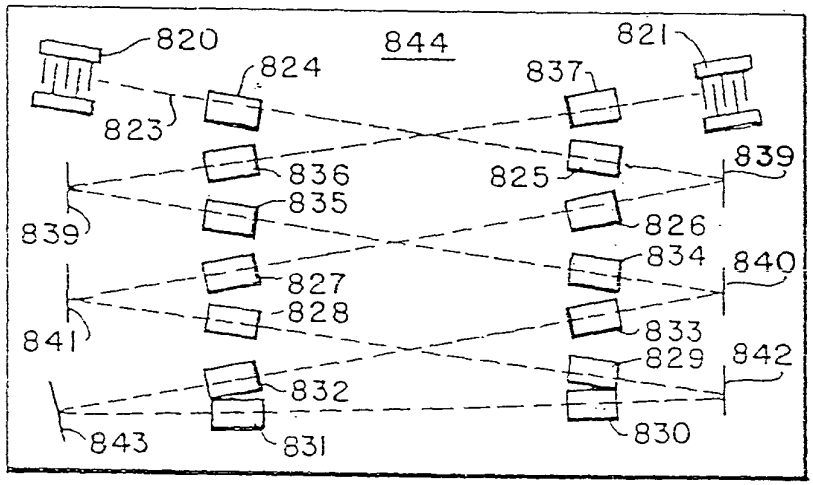
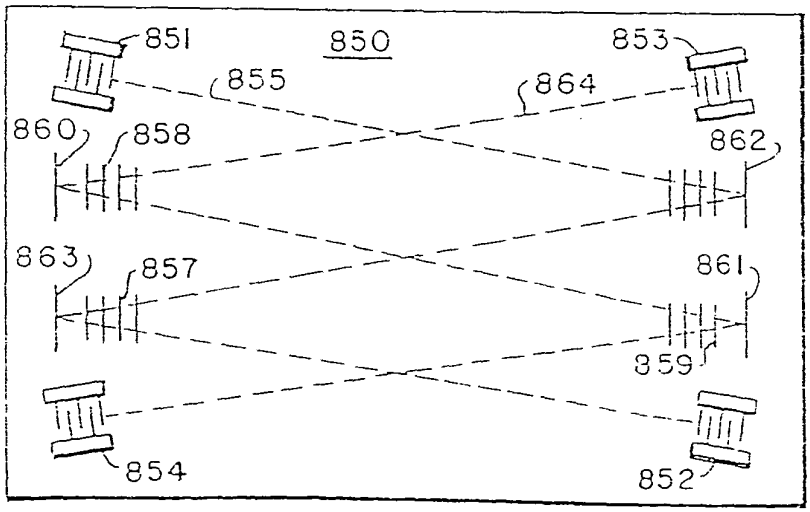


FIG.19C



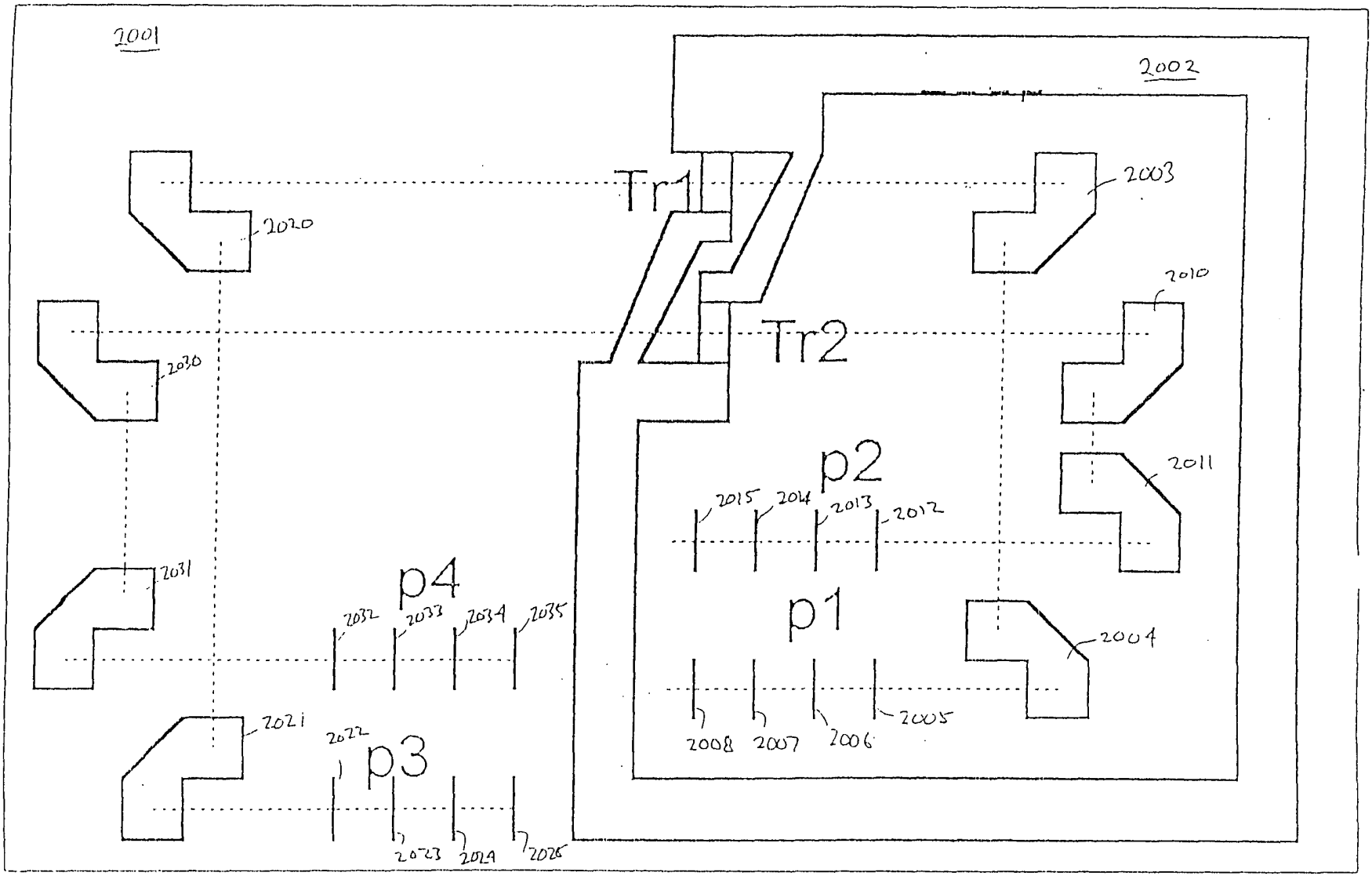

2001
2002
Tr1
Tr2
2020
2030
2031
2021
2003
2010
2011
2004
p1
p2
p3
p4
2015
2014
2013
2012
2008
2007
2006
2005
2032
2033
2034
2035
2022
2023
2024
2025

Fig. 20

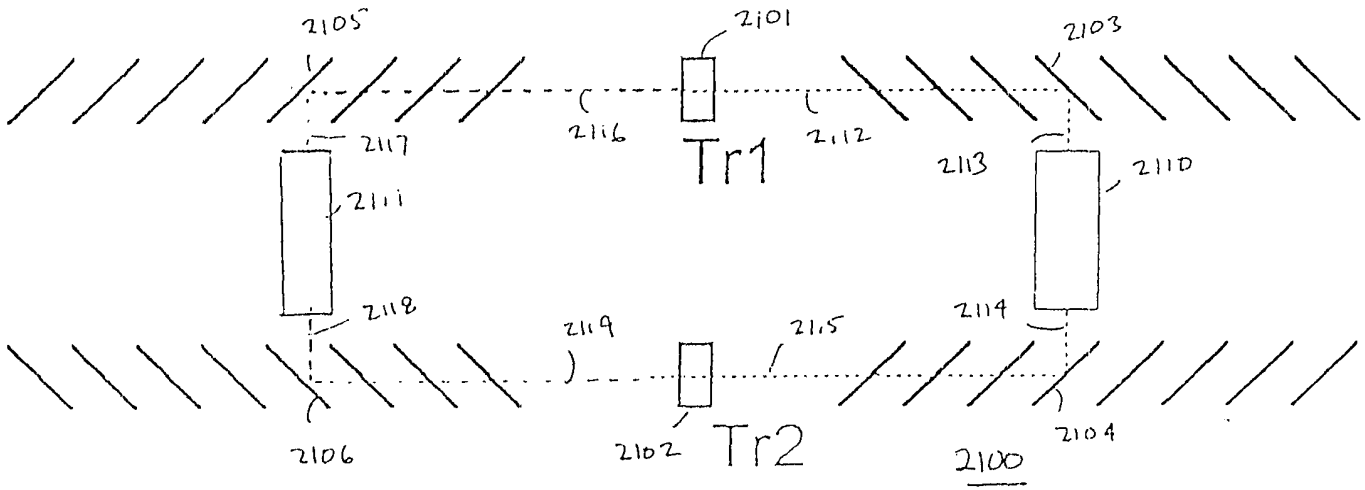

2105
2101
2103
2117
2116
Tr1
2112
2113
2110
2111
2118
2119
2115
2114
2106
2102
Tr2
2104
2100

Fig. 21

Calculation of element reflection and resultant loss per tap (excluding transducer loss) for 16 tap RAC.(8 taps on each side of transducers)

Parameters : top = prop. loss between taps (200 ns delay)
rsp0 =refl. coeff. of 1st tap (one RAC element)
rl0 =prop. loss of 1st tap (1us delay)(dB)

$top := 0.977$

$rp_0 := 0.04 \qquad rl_0 := 1.0 \qquad rsp_0 := \sqrt{rp_0}$

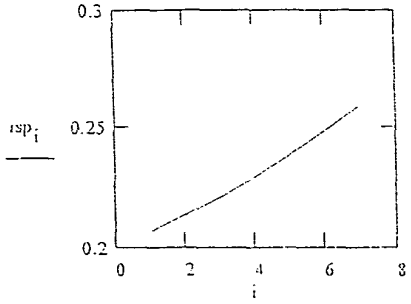
$i := 1 .. 7$

$rp_i := \frac{rp_{i-1}}{1 - rp_{i-1}} \cdot \frac{1}{top} \qquad rl_i := \left(1 - rp_i\right) \cdot top \cdot \frac{rp_i}{rp_{i-1}} \qquad rsp_i := \sqrt{rp_i}$

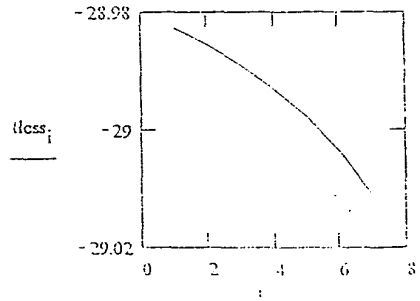
$tloss_i := 20 \cdot \log\left(rl_i \cdot rp_0\right) - 1.0$

$tloss_0 := 20 \cdot \log\left(rp_0\right) - 1.0$

$$rsp = \begin{bmatrix} 0.2 \\ 0.207 \\ 0.214 \\ 0.221 \\ 0.229 \\ 0.238 \\ 0.248 \\ 0.259 \end{bmatrix} \qquad rl = \begin{bmatrix} 1 \\ 0.997 \\ 0.997 \\ 0.997 \\ 0.996 \\ 0.996 \\ 0.995 \\ 0.994 \end{bmatrix} \qquad tloss = \begin{bmatrix} -28.959 \\ -28.983 \\ -28.986 \\ -28.989 \\ -28.993 \\ -28.998 \\ -29.004 \\ -29.011 \end{bmatrix}$$



element reflection as funct. of tap #



transm. loss as funct. of tap #, dB

Fig. 22

Calculation of element reflection and resultant loss per tap (excluding transducer loss) for 16 tap RAC.(8 taps on each side of transducers)

Parameters : top = prop. loss between taps (200 ns delay)
rsp0 =refl. coeff. of 1st tap (one RAC element)
rl0 =prop. loss of 1st tap (1us delay)(dB)

$top := 0.977$

$rp_0 := 0.0625 \qquad rl_0 := 1.0 \qquad rsp_0 := \sqrt{rp_0}$

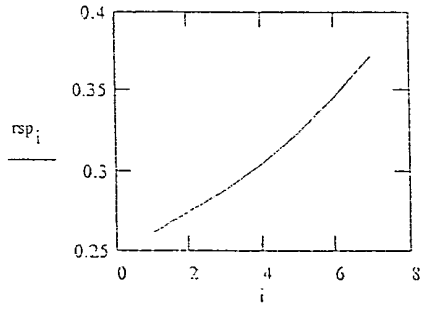
$i := 1 .. 7$

$rp_i := \frac{rp_{i-1}}{1 - rp_{i-1}} \cdot \frac{1}{top} \qquad rl_i := \left(1 - rp_i\right) \cdot top \cdot \frac{rp_i}{rp_{i-1}} \qquad rsp_i := \sqrt{rp_i}$

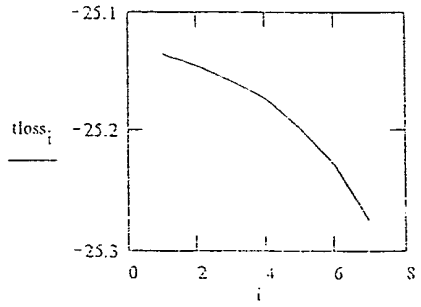
$tloss_i := 20 \cdot \log\left(rl_i \cdot rp_0\right) - 1.0$

$tloss_0 := 20 \cdot \log\left(rp_0\right) - 1.0$

$$rsp = \begin{bmatrix} 0.25 \\ 0.261 \\ 0.274 \\ 0.288 \\ 0.304 \\ 0.323 \\ 0.345 \\ 0.372 \end{bmatrix} \qquad rl = \begin{bmatrix} 1 \\ 0.994 \\ 0.993 \\ 0.991 \\ 0.989 \\ 0.987 \\ 0.983 \\ 0.978 \end{bmatrix} \qquad tloss = \begin{bmatrix} -25.082 \\ -25.136 \\ -25.145 \\ -25.158 \\ -25.174 \\ -25.197 \\ -25.228 \\ -25.275 \end{bmatrix}$$



element reflection as funct. of tap #



transm. loss as funct. of tap #, dB

Fig. 73

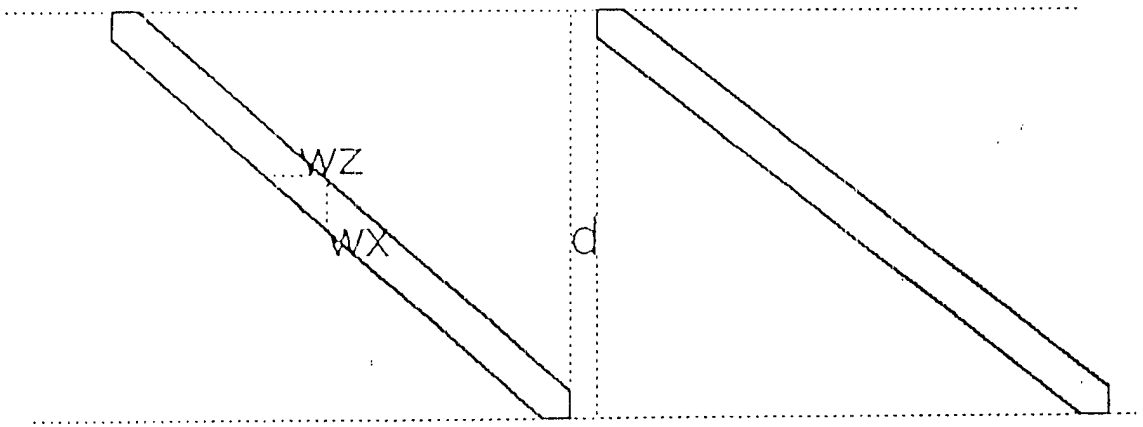


Fig. 24

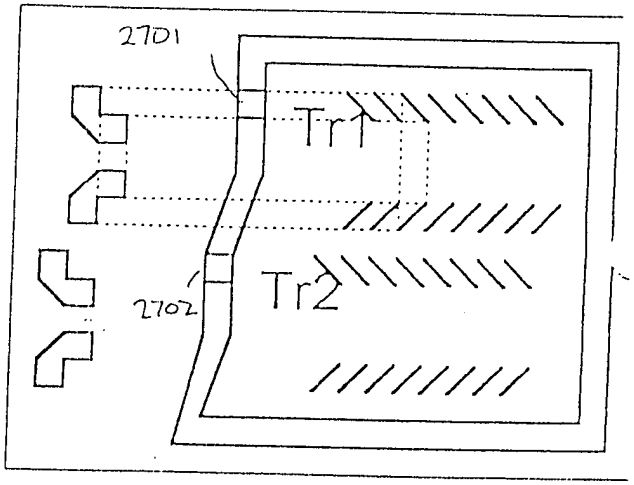


Fig. 27

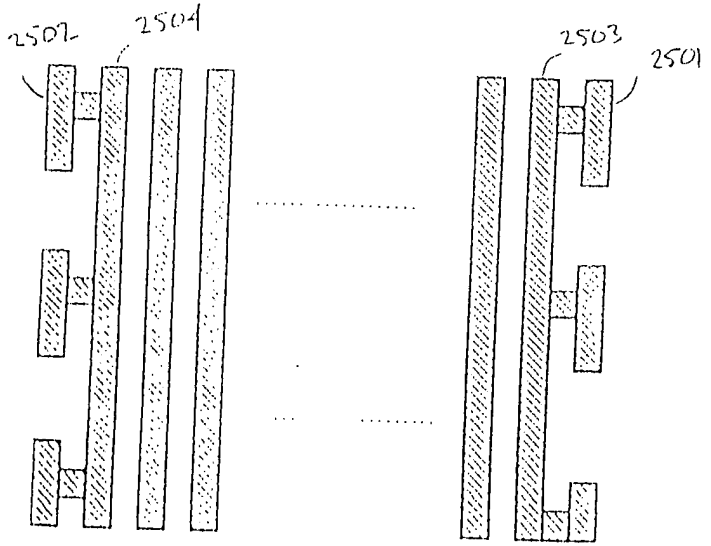


Fig. 25

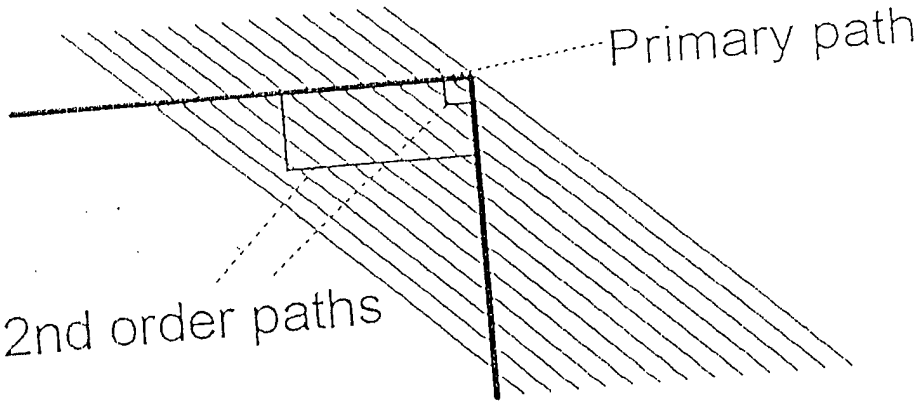
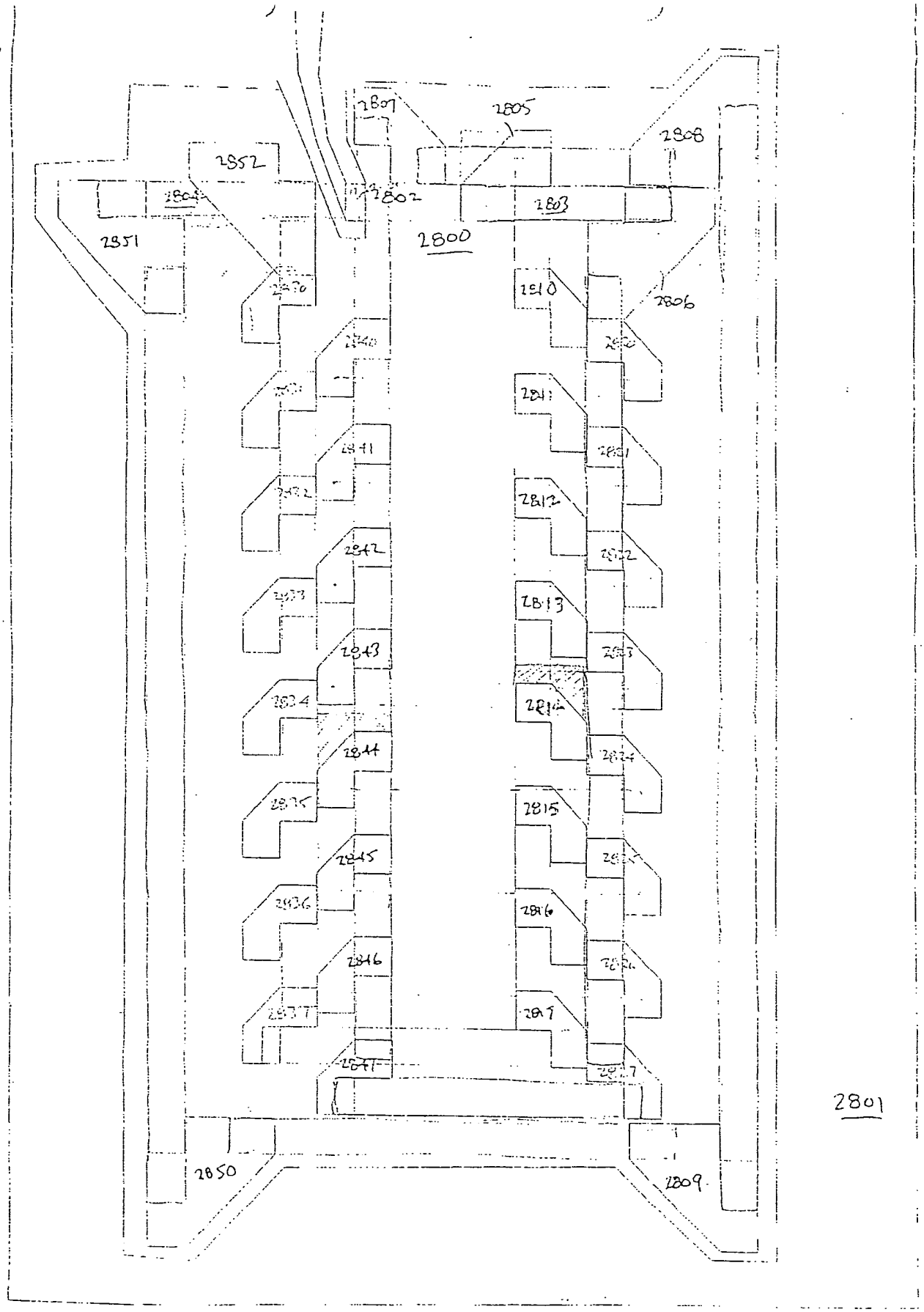


Fig. 26


2807
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2800
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2809

Fig. 28

Fig. 29.

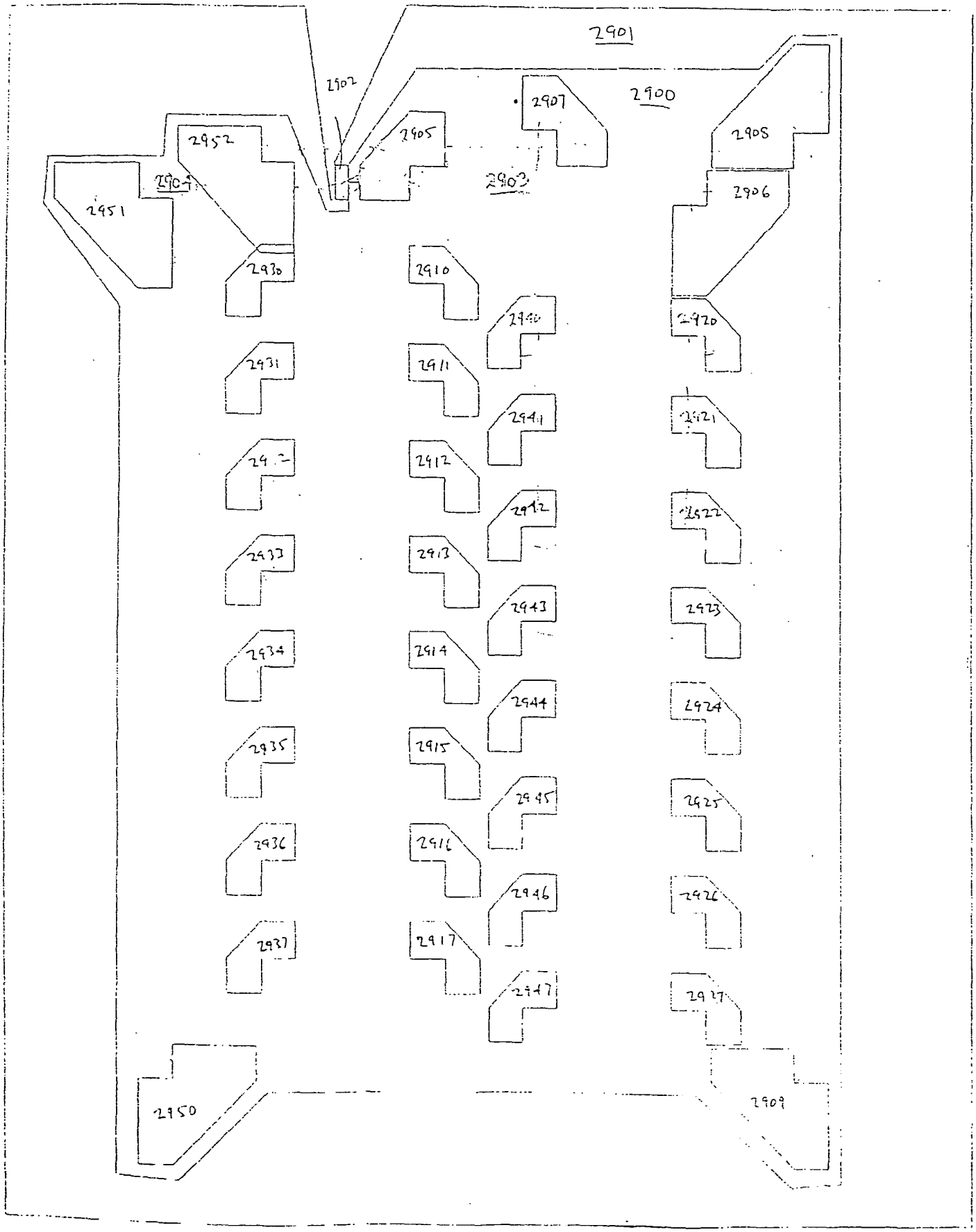
2901
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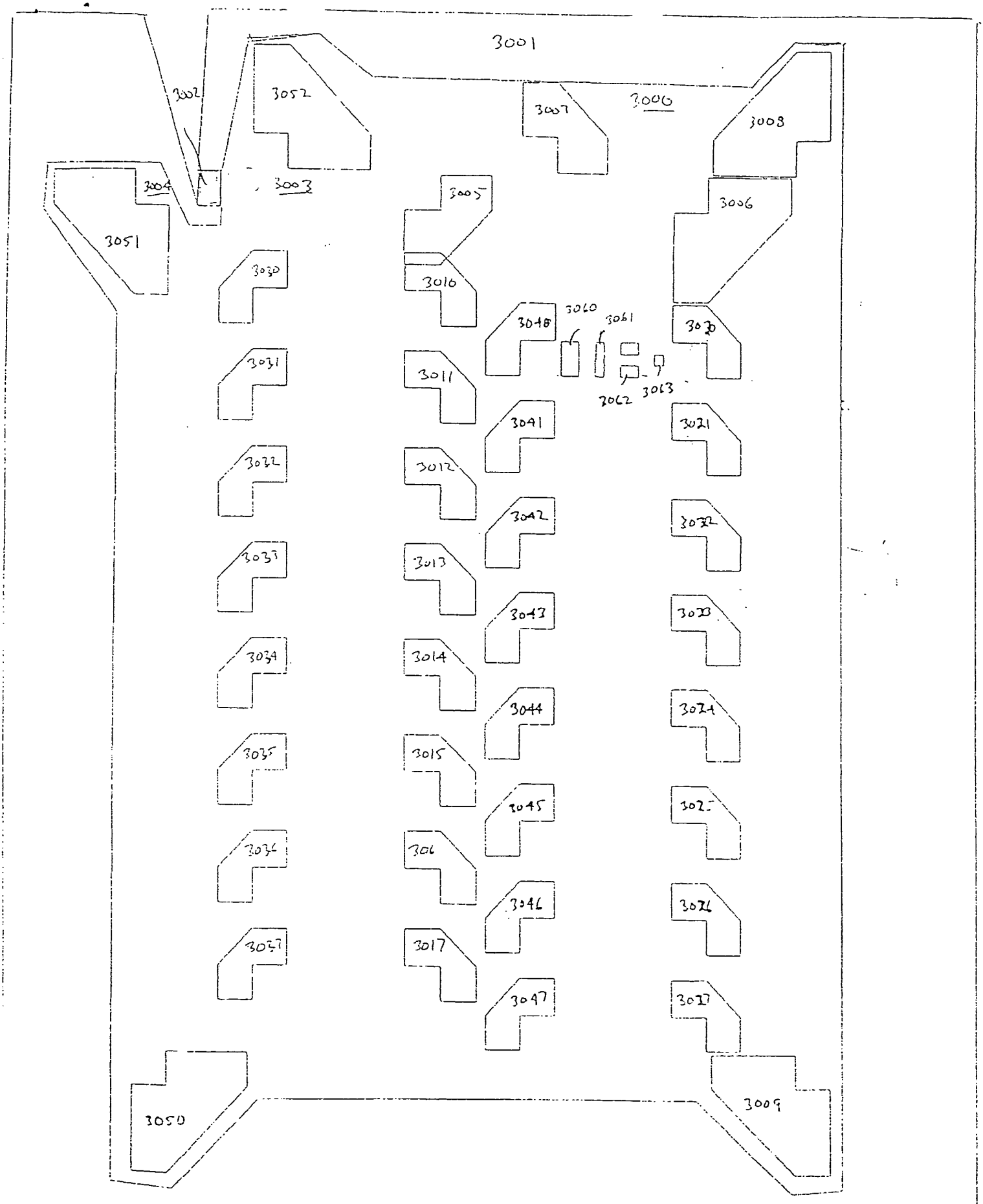
Fig. 30


3001
3002
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3004
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3010
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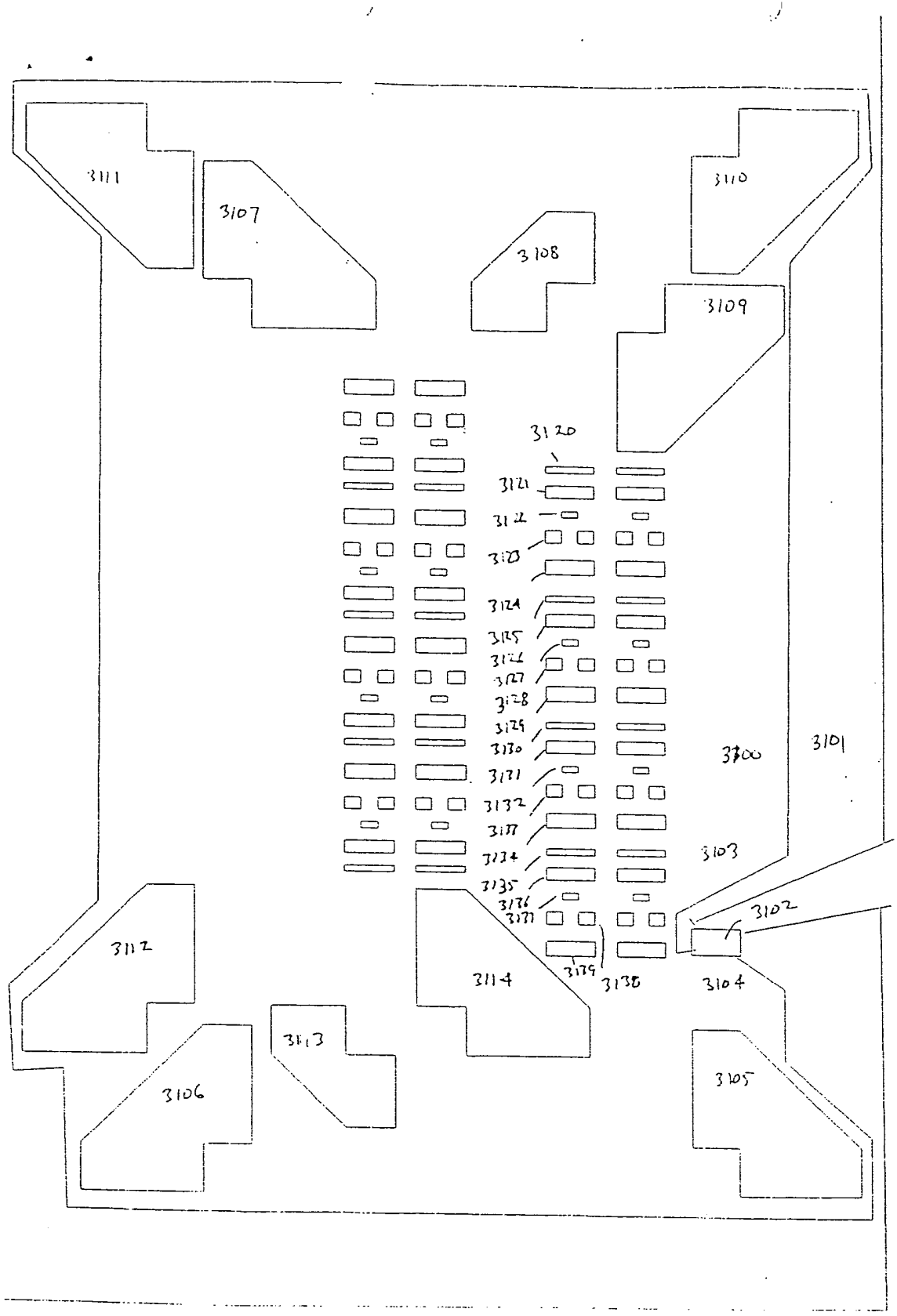
3050
3009


3111
3107
3108
3110
3109
3120
3121
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3123
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3126
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3131
3132
3133
3134
3135
3136
3137
3139
3138
3100
3101
3103
3102
3104
3112
3114
3113
3106
3105

Fig. 31

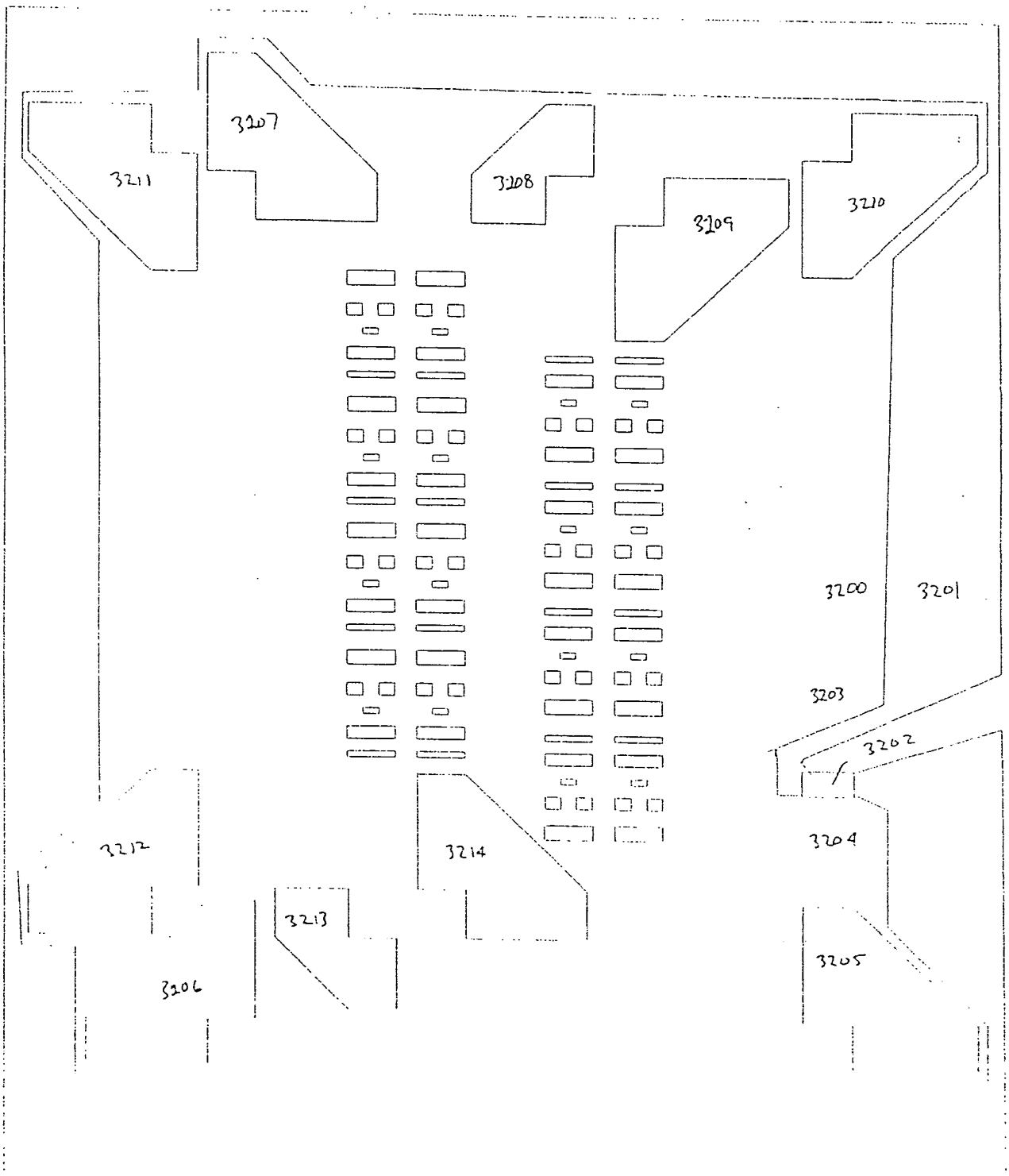
3207
3211
3208
3209
3210
3200
3201
3203
3202
3204
3212
3214
3213
3205
3206

Fig. 32

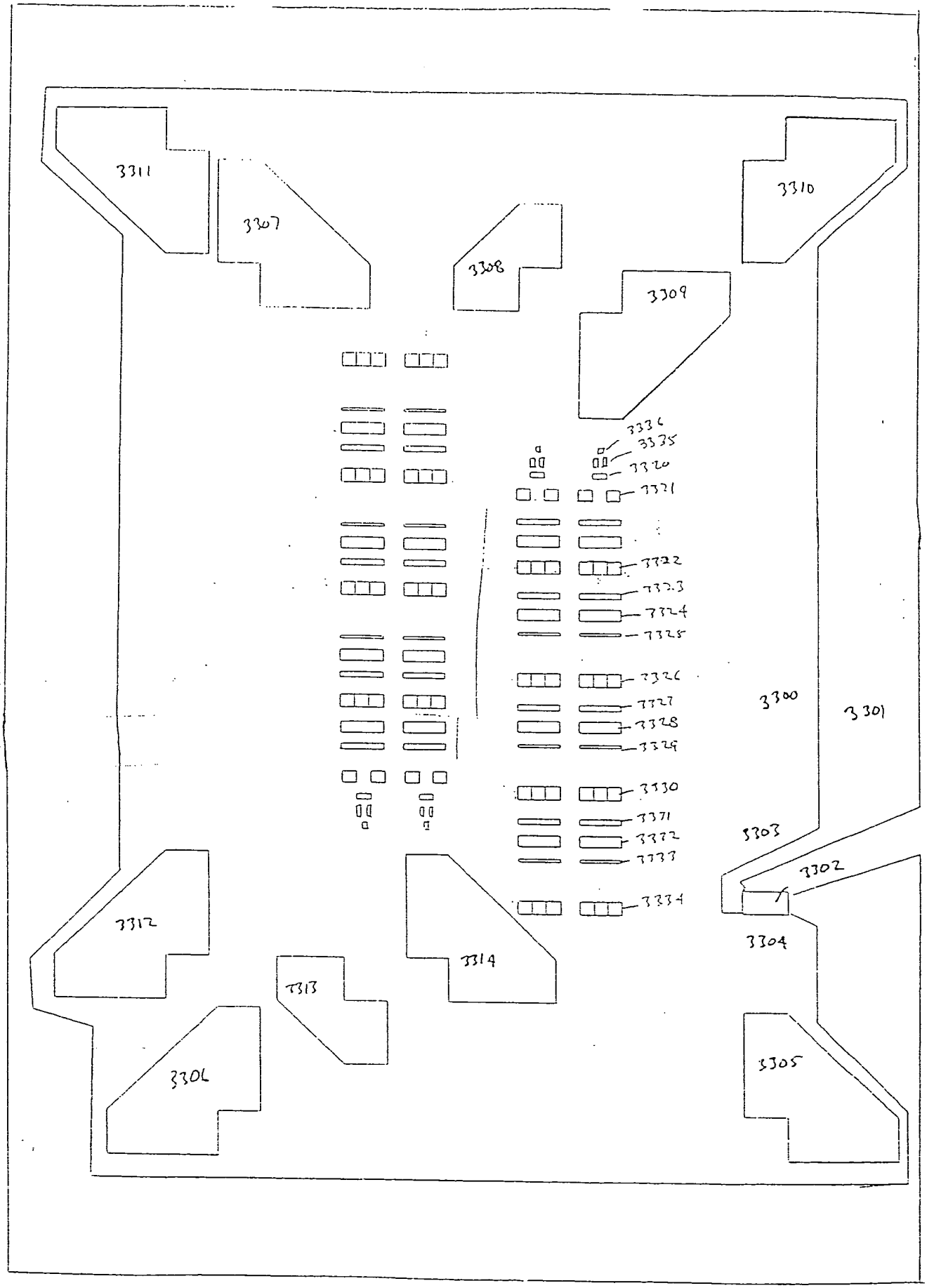
3311
3307
3308
3310
3309
3336
3335
3320
3321
3322
3323
3324
3325
3326
3327
3328
3329
3330
3331
3332
3333
3334
3300
3301
3303
3302
3304
3312
3314
3313
3306
3305

Fig. 33

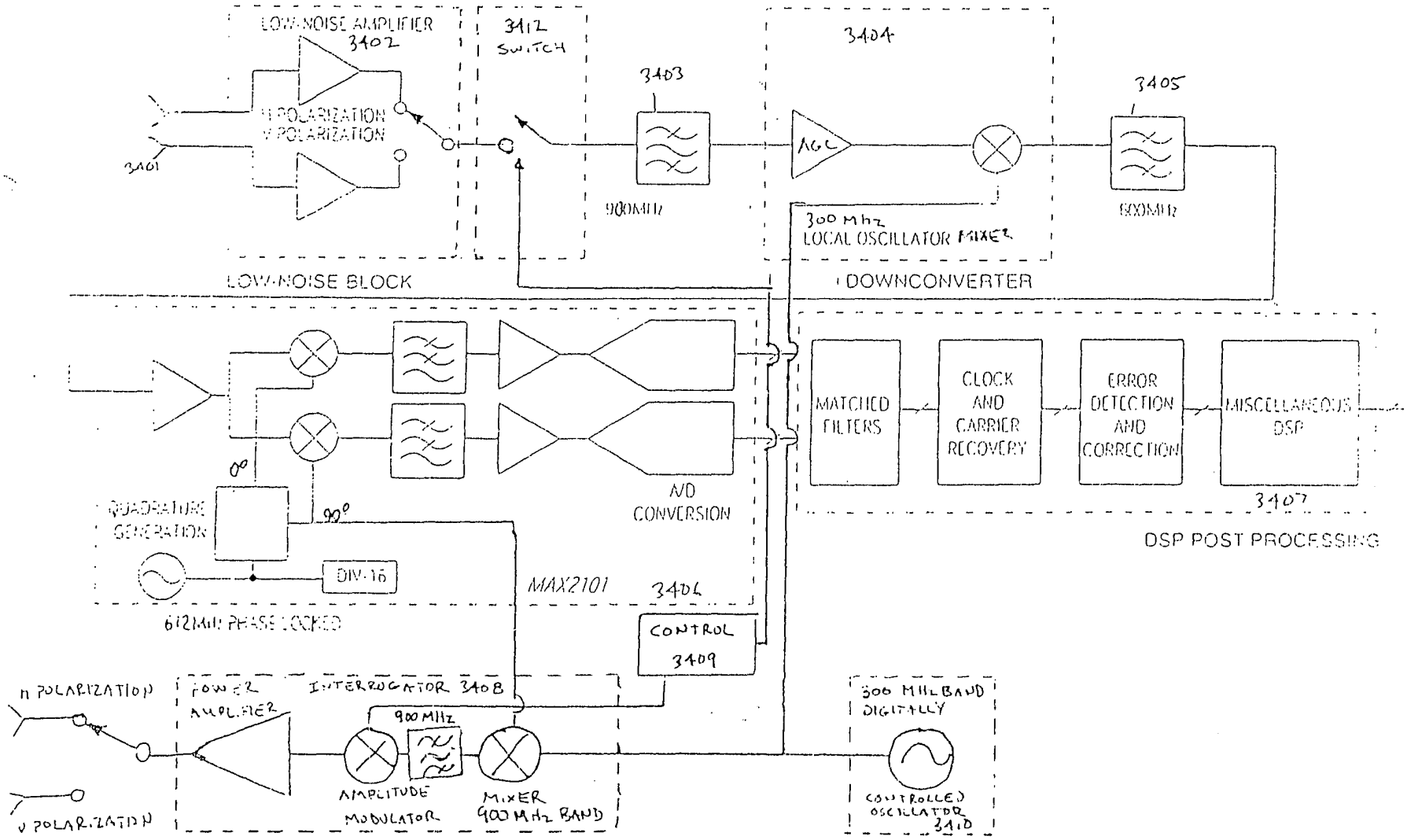
LOW-NOISE AMPLIFIER
3402
3412
SWITCH
3403
3404
3405
H POLARIZATION
V POLARIZATION
3401
900MHz
AGC
900MHz
300 MHz
LOCAL OSCILLATOR MIXER
LOW-NOISE BLOCK
DOWNCONVERTER
MATCHED FILTERS
CLOCK AND CARRIER RECOVERY
ERROR DETECTION AND CORRECTION
MISCELLANEOUS DSP
3407
DSP POST PROCESSING
A/D CONVERSION
0°
90°
QUADRATURE GENERATION
DIV-16
MAX2101
3406
612MHz PHASE LOCKED
CONTROL
3409
H POLARIZATION
V POLARIZATION
POWER AMPLIFIER
INTERROGATOR 340B
900MHz
AMPLITUDE MODULATOR
MIXER 900MHz BAND
300 MHz BAND DIGITALLY
CONTROLLED OSCILLATOR
3410

Fig. 34

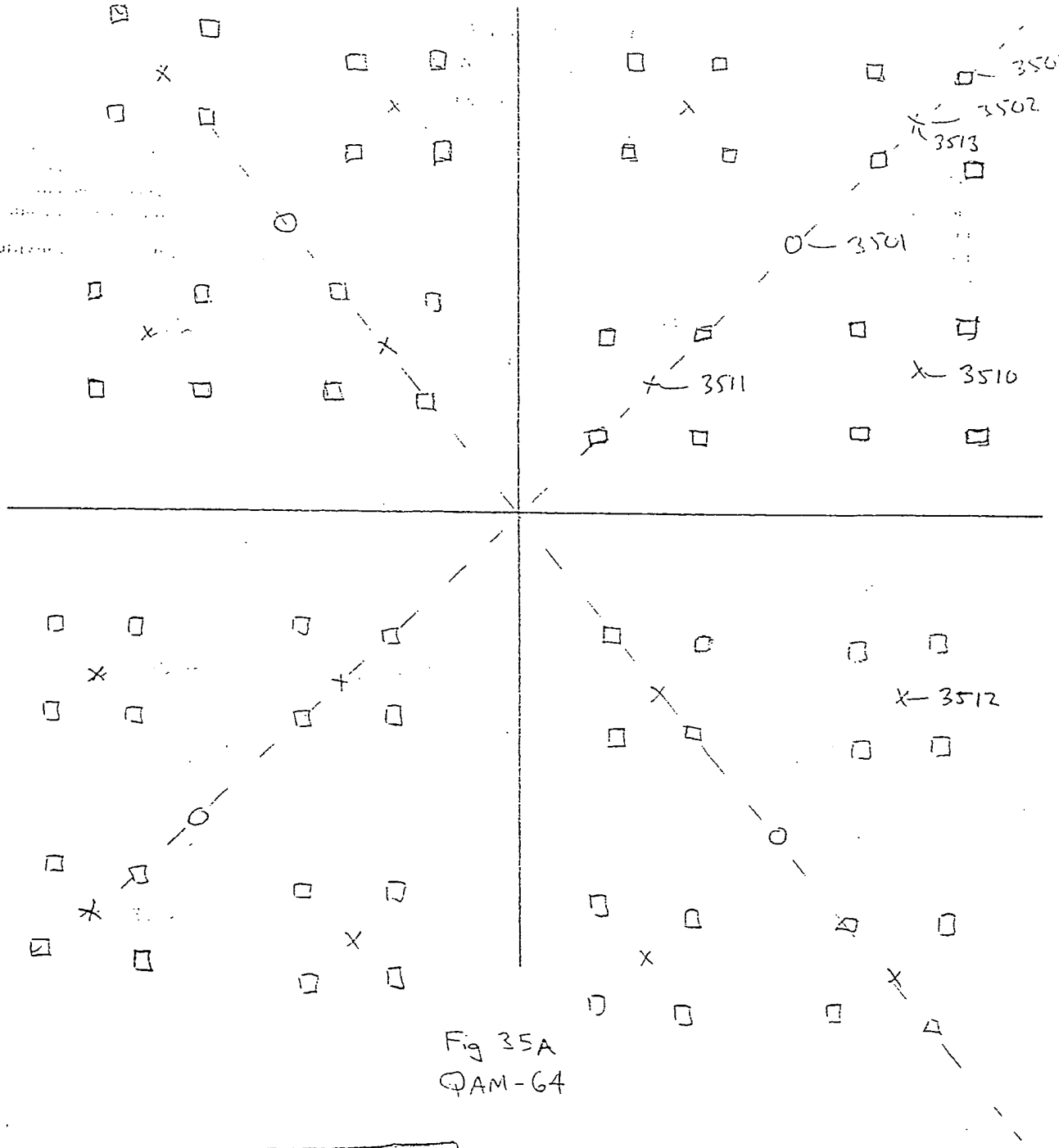

Fig 35A
QAM-64

Phase				
$\frac{\pi}{2}$	+	+	−	−
$\frac{\pi}{4}$	+	−	+	−
result	3510	3511	3512	3513

Phase Splitting

Fig. 35B